

WHAT IS CLAIMED IS:

1. A transfer apparatus comprising:

a belt that rotates and carries either one of a plurality of images directly and a recording material with a plurality of images, a scale is

5 provided along at least one side of entire of the belt;

a sensor that reads the scale on the belt to obtain scale information;

an actual speed calculating unit that calculates a speed of the belt from the scale information; and

10 a control unit that provides a control to correct speed of the belt according to the speed calculated, wherein the control unit includes a frequency-correcting unit that performs correction of only a frequency component that is fluctuating of low frequency that is smaller than a predetermined frequency that is developed due to a change in a speed
15 of the belt, from among speed fluctuations of the belt to adjust the speed of the belt to a predetermined target speed.

2. The transfer apparatus according to claim 1, wherein the frequency correcting unit includes

20 an extracting unit that extracts only the frequency component that is fluctuating; and

a correction control unit that performs correction of the frequency component that is fluctuating extracted by the extracting unit.

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3. The transfer apparatus according to claim 2, wherein the frequency component that is fluctuating appears repeatedly on periodic basis due to any one of components of the belt and components of a driving system of the belt.

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4. The transfer apparatus according to claim 2, wherein the frequency component that is fluctuating is not greater than 100 hertz.

5. The transfer apparatus according to claim 3, wherein the fluctuation in speed of the belt due to the frequency component that is fluctuating is caused by unevenness in a thickness of the belt.

6. The transfer apparatus according to claim 3, wherein the component of the driving system includes a roller that drives the belt and the fluctuation in the speed of the belt due to the frequency component that is fluctuating is caused by an eccentricity of the roller.

7. The transfer apparatus according to claim 6, wherein the fluctuation in the speed of the belt due to the frequency component that is fluctuating includes a change in an amount of the eccentricity of the roller with a change in a temperature of an environment.

8. The transfer apparatus according to claim 3, wherein the component of the belt-driving system includes a tension roller that is in contact with the belt and stretches the belt with a predetermined

tension, and the fluctuation in the speed of the belt due to the frequency component that is fluctuating is caused by a fluctuation in thrust due to pressing the tension roller against the belt.

5 9. The transfer apparatus according to claim 2, wherein the fluctuation in the speed of the belt due to the frequency component that is fluctuating is caused by unevenness in a thickness of the belt and eccentricity of the roller that drives the belt.

10 10. The transfer apparatus according to claim 2, wherein the fluctuation in speed due to the frequency component that is fluctuating is due to unevenness in a thickness of the belt, eccentricity of the roller that drives the belt, and fluctuation in thrust due to pressing the tension roller against the belt.

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11. The transfer apparatus according to claim 2, wherein the belt is an intermediate transfer belt that transfers the images on the plurality of photosensitive drums by directly transferring the images one after another so that the images are superimposed.

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12. The transfer apparatus according to claim 2, wherein the belt is a recording-material carrier belt that carries the recording material and the images on the plurality of photosensitive drums are transferred to the recording material one after another so that the images are

25 superimposed.

13. The transfer apparatus according to claim 1, wherein the frequency-control unit inputs the speed fluctuations and while inputting the speed fluctuations, performs correction of only the frequency component that is fluctuating that is smaller than a predetermined frequency, to adjust the speed of the belt to the target speed.

14. The transfer apparatus according to claim 13, wherein the frequency component that is fluctuating appears repeatedly on periodic basis due to components of the belt or components of a belt-driving system.

15. The transfer apparatus according to claim 13, wherein the frequency component that is fluctuating of low frequency is not greater than 100 hertz.

16. The transfer apparatus according to claim 14, wherein the fluctuation in speed due to the frequency component that is fluctuating of low frequency is caused by unevenness in a thickness of the belt.

17. The transfer apparatus according to claim 3, wherein the component of the belt-driving system includes a roller that drives the belt and the fluctuation in the speed of the belt due to the frequency component that is fluctuating is caused by eccentricity of the roller.

18. The transfer apparatus according to claim 17, wherein the fluctuation in the speed of the belt due to the frequency component that is fluctuating includes a change in an amount of the eccentricity of the roller with a change in a temperature of an environment.

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19. The transfer apparatus according to claim 14, wherein the component of the belt-driving system includes a tension roller that is in contact with the belt and stretches the belt with a predetermined tension, and the fluctuation in the speed of the belt due to the frequency
10 component that is fluctuating is caused by a fluctuation in thrust due to pressing the tension roller against the belt.

20. The transfer apparatus according to claim 13, wherein the fluctuation in the speed of the belt due to the frequency component that
15 is fluctuating is caused by unevenness in a thickness of the belt and eccentricity of the roller that drives the belt.

21. The transfer apparatus according to claim 13, wherein the fluctuation in speed due to the frequency component that is fluctuating
20 is due to unevenness in thickness of the belt, eccentricity of the roller that drives the belt, and fluctuation in thrust due to pressing the tension roller against the belt.

22. The transfer apparatus according to claim 13, wherein the belt is an intermediate transfer belt that transfers the images on the plurality of photosensitive drums by directly transferring the images one after another so that the images are superimposed.

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23. The transfer apparatus according to claim 13, wherein the belt is a recording-material carrier belt that carries the recording material and the images on the plurality of photosensitive drums are transferred to the recording material one after another so that the images are

10 superimposed.

24. An image forming apparatus comprising:

a belt that rotates and carries either one of a plurality of images directly and a recording material with a plurality of images, a scale is provided along at least one side of entire of the belt; and

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a transfer apparatus that includes

a sensor that reads the scale on the belt to obtain scale information;

an actual speed calculating unit that calculates a speed of the belt from the scale information; and

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a control unit that provides a control to correct speed of the belt according to the speed calculated, wherein the control unit includes a frequency-correcting unit that performs correction of only a frequency component that is fluctuating of low frequency that is smaller than a predetermined frequency that is developed due to a change in a

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speed of the belt, from among speed fluctuations of the belt to adjust the speed of the belt to a predetermined target speed.

25. The image forming apparatus according to claim 24, wherein the
5 frequency correcting unit includes

an extracting unit that extracts only the frequency component that is fluctuating; and

a correction control unit that performs correction of the frequency component that is fluctuating extracted by the extracting unit.

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26. The image forming apparatus according to claim 25, wherein the fluctuation in speed of the belt due to the frequency component that is fluctuating is caused by unevenness in a thickness of the belt.

15 27. The image forming apparatus according to claim 25, wherein the component of the driving system includes a roller that drives the belt and the fluctuation in the speed of the belt due to the frequency component that is fluctuating is caused by an eccentricity of the roller.

20 28. The image forming apparatus according to claim 25, wherein the component of the belt-driving system includes a tension roller that is in contact with the belt and stretches the belt with a predetermined tension, and the fluctuation in the speed of the belt due to the frequency component that is fluctuating is caused by a fluctuation in thrust due to
25 pressing the tension roller against the belt.

29. The image forming apparatus according to claim 25, wherein the belt is an intermediate transfer belt that transfers the images on the plurality of photosensitive drums one after another so that the images are superimposed and a transferring section is provided on a bottom
5 side of the intermediate transfer belt to transfer the images on the intermediate transfer belt to the recording material.

30. The image forming apparatus according to claim 24, wherein the frequency-control unit inputs the speed fluctuations and while inputting
10 the speed fluctuations, performs correction of only the frequency component that is fluctuating that is smaller than a predetermined frequency, to adjust the speed of the belt to the target speed.

31. The image forming apparatus according to claim 30, wherein the
15 fluctuation in speed of the belt due to the frequency component that is fluctuating is caused by unevenness in a thickness of the belt.

32. The image forming apparatus according to claim 30, wherein the component of the driving system includes a roller that drives the belt
20 and the fluctuation in the speed of the belt due to the frequency component that is fluctuating is caused by an eccentricity of the roller.

33. The image forming apparatus according to claim 30, wherein the component of the belt-driving system includes a tension roller that is in
25 contact with the belt and stretches the belt with a predetermined tension,

and the fluctuation in the speed of the belt due to the frequency component that is fluctuating is caused by a fluctuation in thrust due to pressing the tension roller against the belt.

5 34. The image forming apparatus according to claim 30, wherein the belt is an intermediate transfer belt that transfers the images on the plurality of photosensitive drums one after another so that the images are superimposed and a transferring section is provided on a bottom side of the intermediate transfer belt to transfer the images on the
10 intermediate transfer belt to the recording material.

35. A method of correcting a speed of a belt, comprising:
 reading a scale on the belt to obtain scale information, the belt being rotatable and carries either one of a plurality of images directly
15 and a recording material with a plurality of images, a scale is provided along at least one side of a portion of the belt;
 calculating a speed of the belt from the scale information; and
 correcting fluctuating frequency component of low frequency smaller than a predetermined frequency that is developed during
20 operation, from among the speed fluctuations of the belt to adjust the speed of the belt to a predetermined target speed.

36. The method according to claim 35, wherein the frequency component that is fluctuating appears repeatedly on periodic basis due
25 to any one of components of the belt and components of a driving

system of the belt.

37. The method according to claim 35, wherein the frequency component that is fluctuating is not greater than 100 hertz.

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38. The method according to claim 36, wherein the fluctuation in speed of the belt due to the frequency component that is fluctuating is caused by unevenness in a thickness of the belt.

10 39. The method according to claim 36, wherein the component of the driving system includes a roller that drives the belt and the fluctuation in the speed of the belt due to the frequency component that is fluctuating is caused by an eccentricity of the roller.

15 40. The method according to claim 36, wherein the fluctuation in the speed of the belt due to the frequency component that is fluctuating is caused by a fluctuation in thrust due to pressing a tension roller against the belt.

20 41. The method according to claim 36, wherein the fluctuation in speed due to the frequency component that is fluctuating is due to unevenness in a thickness of the belt, eccentricity of a roller that drives the belt, and fluctuation in thrust due to pressing a tension roller against the belt.

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